



National System for Geospatial Intelligence

The FGDC Geospatial Metadata Standard and Other Initiatives

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Geospatial Intelligence Standards

Overall Classification of this briefing is **UNCLASSIFIED**

What's *new* with ISO metadata?

1. Content

- CSDGM similar and new elements
- Domains and conditionality
- Essential or core metadata

2. Format

- UML / XML
- Multi-level metadata



ISO Metadata: Implications

the good news....

XML supports consistent and robust implementation via software tools

- Format and exchange
 - current implementation - txt, doc, db file, etc.
 - exchange format is txt
- Internal metadata harvesting and other automated features



ISO Metadata: Implications

more good news....

Multi-level metadata

- Data Series - *wetlands*
- Dataset - *Paducah wetlands*
- Feature Type - *marsh*
- Feature Instance - *Mandy's Marsh*
- Attribute Type - *salinity*
- Attribute Instance - *actual % water salinity*



What about legacy metadata?

Crosswalks drafted for:

- CSDGM Vers. 2.0
- Dublin Core, others

Conversion software in development:

- FGDC sponsored effort with Intergraph /SMMS for standalone
- ESRI has drafted for ArcCatalog



How do I prepare?

Now....

1. Continue creation using CSDGM vers.2 !!!
2. Use ISO-*poised* software
 - ESRI ArcCatalog
 - Intergraph / SMMS
 - MetaD, FGDC/Polytechnic University Catalunya



How do I prepare?

Now....

3. Add one or more ISO Topic Categories to your existing CSDGM metadata records as *Theme_Keywords*

boundaries

oceans

health

transportation

economy

society

elevation

farming

location

biota

structure

environment

utilitiesCommunication

intelligenceMilitary

geoscientificInformation

inlandWaters

imageryBaseMapsEarthCover

planningCadastre

climatologyMeteorologyAtmosphere

more info in FGDC Metadata Quick Guide at fgdc.gov



How do I prepare?

Now....

4. Monitor FGDC website for news, materials, and training opportunities
5. Participate in US Profile development by contacting Sharon Shin, FGDC Metadata Coordinator sharon_shin@usgs.gov



How do I prepare?

Soon...

1. Educate and inform your organization that a migration, and assistance, is in the future
2. Develop a metadata conversion plan using crosswalks and conversion software
3. Adopt 'CSDGM vers. 3.0' when finalized





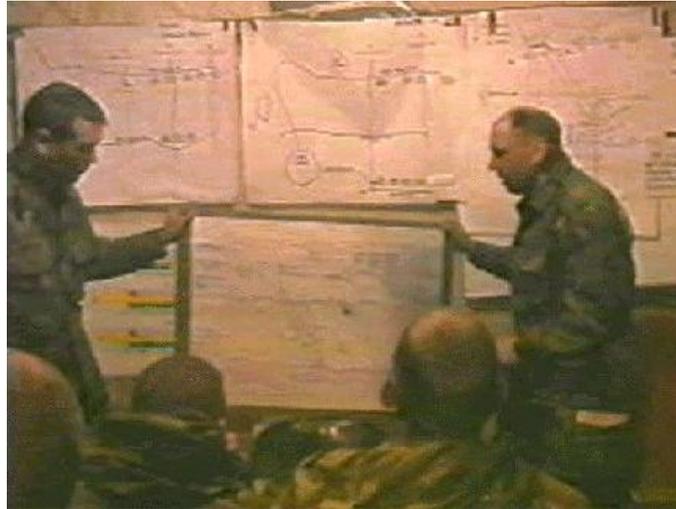
National System for Geospatial Intelligence

The Geospatial Intelligence Standards Working Group (GWG) Metadata Focus Group (MFG) www.gwg.nga.mil

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GEOINT Standards Working Group Inaugurated January 2005



Working as a Community:

- **Eliminate duplicative standards investments** that deliver the same or similar capabilities
- Bring **subject matter experts** together within the DoD and IC to fully address GEOINT standards matters
- Enhance our ability to **manage and share GEOINT data** among disparate groups



GWG Membership

Core Members

- NGA
- CIA
- NRO
- NSA
- Army
- Navy
- Air Force
- Marine Corps
- ODNI
- OSD (NII and AT&L)
- STRATCOM
- SOCOM
- JFCOM
- EUCOM
- PACOM
- NORTHCOM
- Joint Staff (J2)
- DHS
- DOE
- DISA
- DIA
- DLA
- DARPA
- FGDC

Associate Members

- American National Standards Institute (ANSI)
- International Organization for Standardization (ISO) / Chair, TC 211
- Open Geospatial Consortium (OGC)
- US Geospatial Intelligence Foundation (USGIF)
- Digital Geospatial Information Working Group (DGIWG)
- Joint ISR Capability Group (JISRCG)
- ABCA (United Kingdom, Canada, Australia)

GWG Focus Group participation is critical for community SMEs to address specific GEOINT standards needs





GWG Focus Groups

GWG Focus Groups & POCs

- 1. NITFS Technical Board (NTB)**
 - Steve Kerr, (520) 538-5154, ntbchair@nga.mil
- 2. Motion Imagery Standards Board (MISB)**
 - Brian Blank, (703) 262-4542, blankb@nga.mil
- 3. Community Sensor Model Working Group**
 - Neil Sunderland, 703-222-9722, nsunderland@seicorp.com
- 4. GEOINT Reporting**
 - Carol Schimmoller, (937) 522-2773,
Carol.Schimmoller2@wpafb.af.mil



GWG Focus Groups & POCs

5. Geographic Portrayal

- Dan Gleason, 703-814-4575, GleasonD@nga.mil

6. Application Schemas for Feature Encoding

- Cliff Daniels, 703-814-4577, DanielsC@nga.mil

7. Metadata

- Norm Andersen, 703-814-4565, Norman.C.Andersen@nga.mil

8. Information Transfer and Service Architecture

- Rick Pearsall, 703-814-4556 Richard.A.Pearsall@nga.mil





National System for Geospatial Intelligence

Development of NSG Metadata Foundation (NMF) and NSG Metadata Implementation Specification (NMIS)

**National Center for
Geospatial Intelligence Standards**

Overall Classification of this briefing is UNCLASSIFIED

Metadata Focus Group Documents

- **NSG Geospatial Metadata Profile for Discovery and Retrieval**
 - NSG Minimum Geospatial Metadata Common Core
 - Security Core
 - Quality Core
 - Vector Core
 - Raster Core
 - Sensor Core
- **NSG Geospatial Metadata Desk Side Reference**
- **NSG Geospatial Metadata Profile (Field Handbook) for Discovery and Retrieval**
- **Development of Crosswalks between the NSG Minimum Common Core, ISO 19115, IC Metadata, DOD DDMS, and Dublin Core**
- **NSG Metadata Foundation**
- **NSG Metadata Implementation Specification**



Summary

This briefing details the development efforts of the NGCMP and GSIP MP, and the rationale for their convergence into a single development effort to produce the multi-part companion NMF/NMIS profiles

- GEOINT = Geospatial Intelligence**
- GSIP MP = Geospatial Intelligence Structure Implementation Profile Metadata Profile**
- NSG = National System for Geospatial Intelligence**
- NGCMP = NSG Geospatial Core Metadata Profile**
- NMF = NSG Metadata Foundation**
- NMIS = NSG Metadata Implementation Specification**



Background

- NGA had long recognized the need to provide a geospatial metadata specification (“profile”) tailored for the GEOINT community to meet both their current and changing needs
 - Major need was discovery and retrieval of NGA data holdings in various data libraries
- Development of tailored “profile” conducted within GWG Metadata Focus Group (MFG)
- Various metadata standards relevant for compliance by DoD and Intelligence Community (IC) were consulted in formation of tailored GEOINT metadata profile
 - Each of these metadata standards addressed a certain geospatial data type
- Similar development along geospatial data type lines seen as way to go to meet data discovery and retrieval requirements





Geospatial Metadata Drivers

Geospatial Metadata Drivers

- International, DoD, IC standards that “drove” development of GEOINT metadata (some standards mandatory, others voluntary):
 - DoD MWG (Metadata Working Group)
 - Defense Discovery Metadata Specification (DDMS)
 - IC ISC (Information Steering Committee)
 - ICS 2007-500-2 IC Standard for Information Security Marking Metadata
 - ICS 2007-500-3 IC Standard for Information Resource Metadata
 - ICS 2007-500-4 IC Standard for Publication Metadata
 - ISO/TC211 (Technical Committee 211 for Geographics/Geomatics)
 - ISO 19115:2003/Cor1:2006 Geospatial Metadata
 - ISO 19139 XML Schema Implementation of ISO 19115:2003
 - **(in development)* ISO 19115-2 Extensions for Imagery and Gridded Data
 - **(in development)* ISO 19130 Imagery Sensor Models for Geopositioning
 - ISO 15836 Dublin Core Metadata Set
 - ISO/IEC JTC1 SC24
 - ISO/IEC 12087-5 Basic Image Interchange Format (BIIF) / NITFS
 - ISO/IEC JTC1 SC29
 - ISO/IEC 15444JPEG 2000





Metadata Harmonization efforts

Geospatial Metadata Harmonization Activities

- Distributed Common Ground System Multi-Service Execution Team Metadata Working Group (DCGS MET MWG)
- DIA MASINT Standards Management & XML CCB
- Digital Geospatial Information Metadata Working Group (DGIWG MWG)
- JITC XML Multi-Function Lab
- Multinational Geospatial Co-Production Group Technical Group (MGCP TG)
- NATO Joint Capability Group for ISR (JCGISR) STANAG Metadata Harmonization (JCGISR MH TST)
- GeoScout
- NGA Enterprise Engineering (EE)
- NGA Image Product Libraries Access Standardization Working Group (IPL ASWG)
- National Reconnaissance Agency (NRO) & NRO IMINT Labs (ILABS)

GWG
MFG

Harmonizing
Metadata
Among:

Contributors



Geospatial Metadata Harmonization Activities

- Advanced Geospatial Intelligence Metadata Profile Working Group (AGI MPWG)
- American National Standards Institute/International Committee for Information Technology Standards – Geographics Committee (ANSI/INCITS L1)
- Central Intelligence Agency (CIA)
- Defense Information Systems Agency (DISA)
- Dept Homeland Security Community of Interest Metadata Working Group (DHS COI MWG)
- Federal Geographic Data Committee (FGDC)
- Geospatial Intelligence Standards Working Group (GWG) and Relevant Focus Groups
- Motion Imagery Standards Board Metadata Working Group (MISB MWG)
- National Imagery Transmission Format Standard Technical Board (NTB)
- National Security Agency (NSA)
- NGA Engineering Data Working Group Metadata Focus Group (EDWG MFG)
- Open Geospatial Consortium (OGC)

GWG
MFG

Harmonizing

Metadata
Among:

Partners





Metadata Activities

International

- NATO Joint Capability Group for ISR (JCGISR) STANAG Metadata Harmonization Technical Support Team (JCGISR MH TST)
- Multinational Geospatial Co-Production Group Technical Group (MGCP TG)
- ISO/TC 211/INCITS Geographic Information
- North American Profile with Canada
- Standards of the Americas with South, Latin and North America



Internal to NGA

- ASDi (I &E) Analytic Spatial Data initiative
- GEOINT Knowledge Base -feature
- Overhead Non-Imaging Infrared (ONIR)
- GeoScout – NAC Section 5 and Appendix E Update
- Audio Gazetteers—Unconventional Sources and New Uses for Place Names
- IRAQ – Educational support in reference to the of the MGCP by Analyst (NGA and CENTCOM)



Other Metadata Activities

- ODNI – Office of the Director for National Intelligence
- NRO – National Reconnaissance Office
- Distributed Common Ground System Multi-Service Execution Team Metadata Working Group (DCGS MET MWG) Universal Core
- NIAT- NGA Interoperability Action Team
- AMPS – Automated Metadata Population System
- Universal Core







Backup Slides



Status of US Implementation of ISO Metadata

Lynda Wayne

US Federal Geographic Data Committee / GeoMaxim

Sharon Shin

US Federal Geographic Data Committee

October 2005

ISO Metadata: Content

CSDGM Similar Elements

- same
 - Metadata Standard Name*
- new terminology and definitions

CSDGM = *Originator*

ISO = *Responsible Party*

*w/ Role = originator
custodian
owner
publisher....*



ISO Metadata: Content

New (non-CSDGM) Elements

- International elements
 - Data / Metadata Language*
- Extended elements
 - CSDGM = geographic and temporal extent
 - ISO = geographic, temporal, & *vertical* extent
- Lacking elements
 - ISO *Topic Category* – 19 standardized subject categories to facilitate data discovery



ISO Metadata: Content

Domains and Conditionality

- Fewer mandatory elements
 - Core contains only 7 mandatory elements
- Fixed domains and code lists in place of free text to control vocabulary and improve discovery
 - Responsible Party - Role and Topic Categories* represented as codes
 - *Role = Originator (006)*
 - *Topic Category = Transportation (018)*
- More optional elements



ISO Metadata: New Content

ISO Core Metadata

- ▶ 22 basic metadata elements
- ▶ comprise essential metadata for all geospatial data
 - digital data
 - maps and charts
 - text
- ▶ Element conditionality
 - mandatory
 - conditional
 - optional
- ▶ all national profiles of ISO must include the core



ISO Metadata: Core Elements

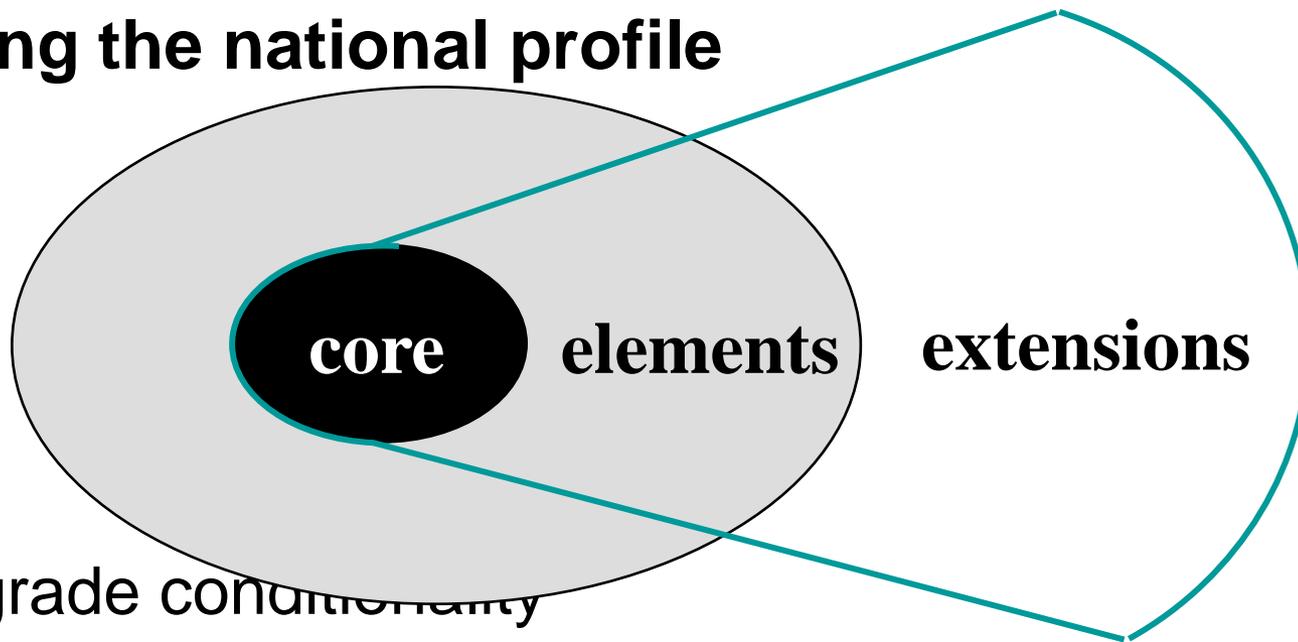
Dataset title	Spatial representation type
Dataset reference date	Reference system
Dataset responsible party	Lineage statement
Geographic location	On-line resource
Dataset language	Metadata file identifier
Dataset character set	Metadata standard name
Dataset topic category	Metadata standard version
Spatial resolution	Metadata language
Abstract	Metadata character set
Distribution format	Metadata point of contact
Additional extent info (vert / temp)	Metadata date stamp

***mandatory*



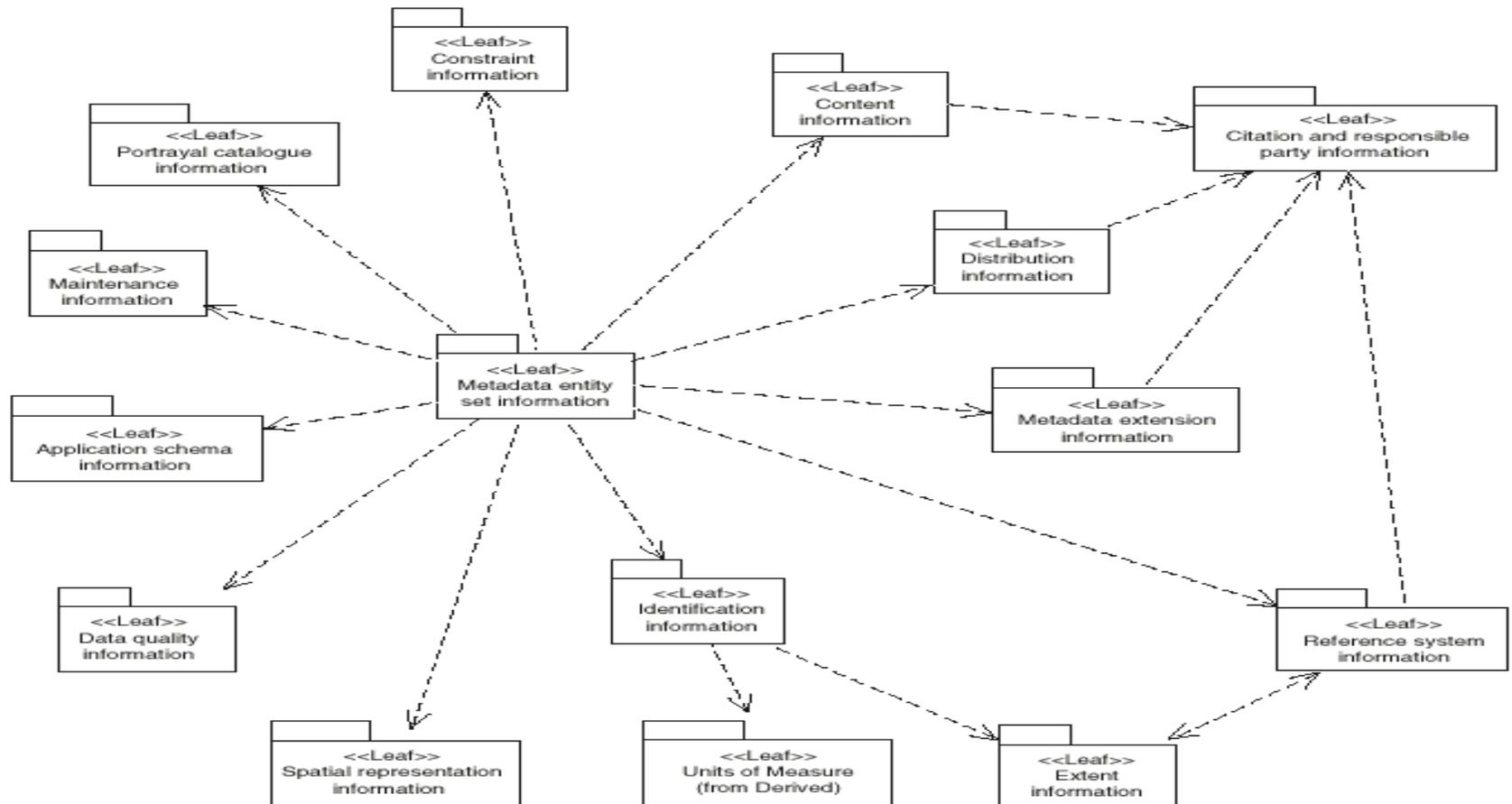
ISO Metadata: New Content

Building the national profile



- Upgrade conditionality
- Extend codelists
- Establish codelists

ISO Metadata: UML Model



ISO Metadata: 19139 XML Schema

```
<?xml version="1.0" ?>
<!-- <!DOCTYPE metadata SYSTEM "http://www.esri.com/metadata/esriprof80.dtd" -->
- <metadata xml:lang="en">
- <Esri>
  <CreaDate>20021022</CreaDate>
  <CreaTime>18074000</CreaTime>
  <SyncDate>20000524</SyncDate>
  <SyncTime>15394800</SyncTime>
  <ModDate>20021022</ModDate>
  <ModTime>17551400</ModTime>
  <MetaID>{1D5DCFB6-88E3-4EDA-B866-4886B36D0E96}</MetaID>
  <SyncOnce>TRUE</SyncOnce>
</Esri>
- <idinfo>
  <native Sync="TRUE">Windows NT Version 4.0 (Build 1381) Service Pack 4;
  ESRI ArcInfo 8.1.0.472</native>
- <descript>
  <langdata Sync="TRUE">en</langdata>
  <abstract Sync="TRUE">REQUIRED: A brief narrative summary of the data
  set.</abstract>
  <purpose Sync="TRUE">REQUIRED: A summary of the intentions with
```



ISO Metadata: Implications

the not-so-great news....

Standard can no longer be 'read' by most geospatial data developers

- greater dependency on tools
- lack of direct contact difficult for some metadata creators - analogous to moving from command line to GUI

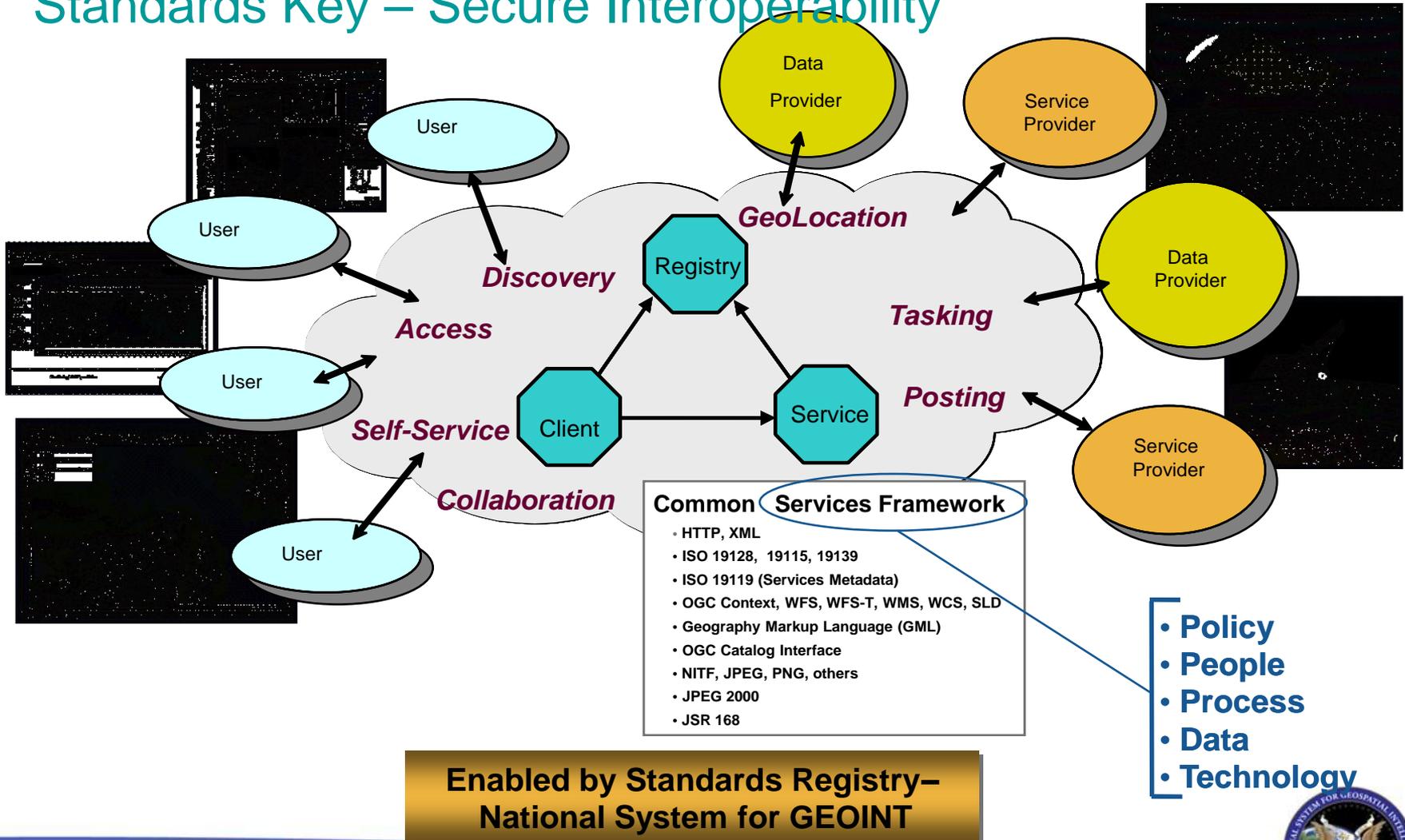




Service Architecture

Service Oriented Architecture

Standards Key – Secure Interoperability



Service Oriented Architecture

Homeland Security Example

- 3,300 Counties in the US
- 85,000 Municipalities
- Most have very high resolution GIS's
- \$2 – 4 Billion invested annually in geospatial data
- Web-facing services that link these data together allow the Homeland Security Community to leverage that investment



Service Oriented Architecture

NGA Partner for Homeland Defense Geospatial Data

National Map Viewer - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://nmviewgoc.cr.usgs.gov/viewer.htm>

USGS The National Map Viewer

Overview
Zoom In
Zoom Out
Zoom
Region
Full Extent
Re-center
Identify
Find Place
Elevation
Measure
Clear
Print
Download
Options
Help

Scale

Layers Legend

- Other
- Orthoimagery
 - DOQ
 - No layers available.
- OTHER IMAGERY
 - Aerial Photograph (S
 - SATELLITE
 - No layers available.
- SCANNED MAPS
- No layers available.
- Land Use/Land Cover
- Transportation
 - MISC. TRANSPORTATION
 - Airport (Sedgwick Co
 - RAILROADS
 - Railroads (Sedgwick
 - ROADS
 - Kansas Highways (RN
 - Kansas Roads (RNMP
 - Sedgwick Co Highwa
 - Sedgwick Co Roads -
- Geographic Names
- Administrative
- Hydrography
- Structures

Redraw Map

Layer Metadata | Map Information | Sedgwick County | USGS | U.S. Forest Service | RNMP | Idaho Water Resources | U.S. Fish & Wildlife Service | BLM

U.S. Department of the Interior, U.S. Geological Survey, Lakewood, CO, USA
URL: <http://nmviewgoc.cr.usgs.gov/>
Contact: National Map Team
Last modification: 01/30/2004

FIRSTGOV

Map: -97° 20' 34" , 37° 41' 16" -- NatGrid: 14S PG 46125 72465 (NAD83) -- ScaleFactor: 0 dec degrees/pixel

Internet



Service Oriented Architecture

Benefits of Standards

- Cost Savings
 - Reduction in varieties of systems, development, testing
 - Ease of implementation & maintenance
 - Plug-n-play / interoperability of alternate vendor components
 - Protection against obsolescence
 - Ease of integration
- Cost Avoidance
 - Shallower learning curve
 - Finding trained & experienced personnel for technologies is easier than for proprietary technologies
 - Reduce redundancy
- Increased Capability
 - Interoperability
 - Common Operating Picture
 - Multi-INT fusion
- Timeliness
 - Rapid insert of new technologies or enhancement in support of the warfighter





NGA Standards Governance and Community Coordination

CL Reason:

DECL ON:

How NGA Manages Standards

- Internally, NGA has formed a body, the NGA Standards Board (NSB) to oversee the governance and processes for managing GEOINT and IT standards activities within NGA. This includes the review and development of the NGA TV-1 and TV-2.
- The NSB is a two-tiered governance body:
 - The Executive Committee: consists of senior stakeholder representatives who advocate for and resolve standards issues
 - The NSB Taskforce: consists of working level stakeholder representatives who provide subject matter expertise
- Externally, as the functional manager for GEOINT, NGA continues to lead the Geospatial Intelligence Standards Working Group (GWG) which serves as a US DoD, Intelligence Community (IC), Federal, and Civil community-based forum for GEOINT standards.
- The GWG recommends the adoption of standards to the DoD IT Standards Registry (DISR) to enable the discovery, access, integration, dissemination, exploitation and interoperability of GEOINT. The DISR serves as the registry of GEOINT standards and mandates the use of those standards within the National System for Geospatial-Intelligence (NSG) community.





Geospatial Metadata Drivers

Metadata Cores and Extensions

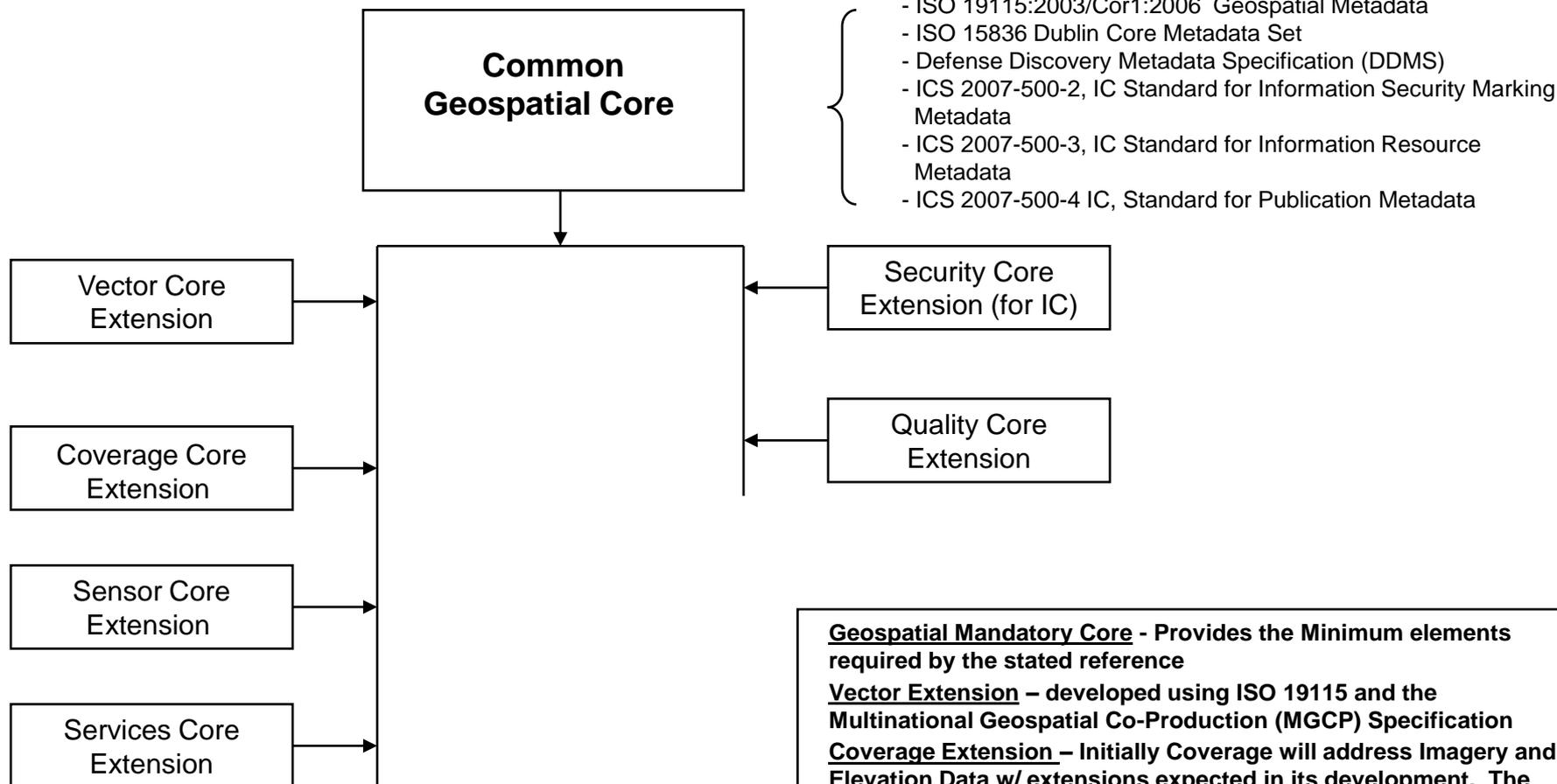
- MFG set out to develop the metadata needed to represent a “profile” of these geospatial metadata “Drivers”
 - All metadata standards requirements for DoD and IC entities assembled into one standard
 - to ease the documentation burden on the DoD/IC user
- Several metadata “sets” or “cores” were formed and consisted of the basic minimum metadata to describe various major geospatial data types applicable for GEOINT
- Sets would consist of metadata both “mandatory” for use and “optional” for use depending on specifications in “Drivers” and needs of GEOINT community



Metadata Cores and Extensions

- A general Core metadata set was derived that consisted of metadata common to all datasets of geospatial information
 - *Common Geospatial Core* metadata set
- Additional core metadata sets were derived that consisted of additional metadata of greater detail and narrower scope that “extended” the basic common metadata core for more specific use
 - Core metadata set for vector data (*Vector Core*)
 - Core metadata set for imagery data (*Imagery Core*)
 - Core metadata set for sensor data (*Sensor Core*)
- Each core contains both “mandatory” and “optional” metadata elements





Geospatial Mandatory Core - Provides the Minimum elements required by the stated reference

Vector Extension – developed using ISO 19115 and the Multinational Geospatial Co-Production (MGCP) Specification

Coverage Extension – Initially Coverage will address Imagery and Elevation Data w/ extensions expected in its development. The NITFS Technical Board (NTB) is the SME for imagery

Sensor Extension – The SME for Sensor Metadata is the GWG Community Model Sensor Working Group (CSMWG)

Services Extension – ISO TC 211 – Geographics standards

Security Extension – The security markings requirements come from the IC via IISS Information Security Markings

Quality Extensions – ISO TC 211 – Geographics standards



NMF Organization

- NMF Parts
 - Part 1: Conceptual Schema and Its Profiles
 - Defines Conceptual Schema (derived from all NGCMP & GSIP MP metadata)
 - Defines business rules for profiling Conceptual Schema
 - Defines NMF Resource Metadata Profile (NGCMP metadata content)
 - Defines GSIP Resource Metadata Profile
 - Part 2: Governance
 - Part 3: Related External Vocabularies



NMIS Organization

- NMIS Parts (provides the encoding of the NMF Part 1)
 - Part 1: Logical Model
 - Specifies logical metadata model, rules to restrict/extend that model, logical conformance tests
 - Part 2: XML Exchange Schema
 - Specifies XML schema, rules to derive schema from Logical Model, rules to restrict/extend that schema, physical conformance tests
 - Part 3: Entity-Relationship (E-R) Schema
 - Specifies E-R physical storage schema, rules to derive schema from Logical Model, conformance tests
 - Part 4: Publication for Geospatial Resources
 - Specifies model to derive externally-specified metadata from NMIS-conformant metadata, rules for tailoring that model for specific business practices, mechanisms to implement that model



NMIS Organization

- NMIS Parts (cont)
 - Part 5: Vector Extension
 - Specifies metadata model extension for vector data, rules to restrict/extend that model, XML schema, E-R storage schema, conformance tests
 - Part 6: Coverage Extension
 - Specifies metadata model extension for coverage data, rules to restrict/extend that model, XML schema, E-R storage schema, conformance tests
 - **(Not in initial version)* Part 7: Sensor Extension
 - Defines
 - Part 8: Service Extension
 - Specifies metadata model extension for data services, rules to restrict/extend that model, XML schema, E-R storage schema, conformance tests

